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The Human Resource Management Information Network (HRMIN) : a cost comparison in accordance with Office of Management and Budget (OMB) Circular No. A-76, of 5 April 1979.

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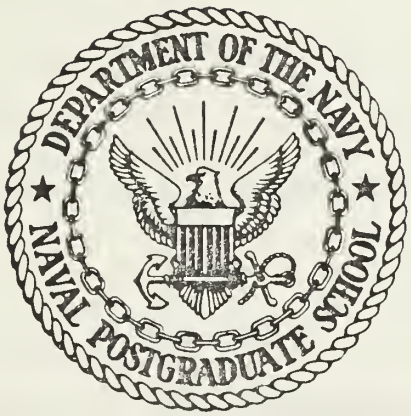

THESIS

THE HUMAN RESOURCE MANAGEMENT
INFORMATION NETWORK (HRMIN):
A COST COMPARISON IN ACCORDANCE WITH
OFFICE OF MANAGEMENT AND BUDGET (OMB)
CIRCULAR NO. A-76, OF 5 APRIL 1979

by

Gary Mitchell Matyas

December 1984

Thesis Advisor: Norman R. Lyons

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The Human Resource Management Information Network (HRMIN) was conceived and developed "in-house" by the Navy Military Personnel Command (NMPC) and the Navy Personnel Research and Development Center (NPRDC). This report is an attempt to ascertain the compliance of this in-house development with the Office of Management and Budget policy on the acquisition of commercial

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The Human Resource Management Information Network (HRMIN): A Cost Comparison in Accordance with Office of Management and Budget (OMB) Circular No. A-76, of 5 April 1979

by

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MASTER OF SCIENCE IN MANAGEMENT

from the

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December 1984

ABSTRACT

The Human Resource Management Information Network (HRMIN) was conceived and developed "in-house" by the Navy Military Personnel Command (NMPC) and the Navy Personnel Research and Development Center (NPRDC). This report is an attempt to ascertain the compliance of this in-house development with the Office of Management and Budget policy on the acquisition of commercial or industrial products and services needed by the government. A cost comparison of the in-house performance cost and the contract-out cost of providing the services required of HRMIN indicate that the present in-house performance is the most cost effective alternative. Therefore conversion to a contracted-out performance should not be undertaken.

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I. INTRODUCTION

A. GENERAL

> In order to address all aspects of human resource management, the U.S. Navy, in 1971, established a Human Resource Development Project to develop, implement, and evaluate a variety of interrelated but separate programs, including race relations, organization development and management, overseas diplomacy, drug and alcohol education, drug abuse control, and alcoholism prevention. (Chief of Naval Operations, 1975, p. 1)

Today these programs are subsets of the Human Resource Management Support System (HRMSS). The management of these programs requires gathering and processing vast quantities of information. In 1978 the HRMSS initiated an effort to develop a workable system to handle this information. The outcome of this effort is today known as the Human Resource Management Information Network (HRMIN).

B. PURPOSE OF STUDY

The development of HRMIN has progressed to the brink of operational status. This development was performed in-house, which means by an agency of the U.S. Government. In 1979 the Executive Department policy of the U.S. Government concerning the acquisition of services needed by the government was revised. The policy requires a review of each commercial or industrial activity costing more than $100,000 by every agency of the government which runs one, to determine if

existing performance, in-house or contract, continues to be in accordance with the policy and guidelines set forth. HRMIN at NPRDC meets the guidelines required for this review. It is therefore the intention of the author to review the HRMIN project to ascertain if it is in accordance with the government policy. The government policy is specified in the Office of Management and Budget (OMB) Circular No. A-76 of 5 April 1979.

C. METHODOLOGY

The framework of this review is a cost comparison of in-house performance costs and the costs of contracting-out the performance. Any conclusions to this study will be based on the application of the requirements of this circular to the results obtained from the cost comparison.

It is not the intent of the author to provide a learning experience in the multiple disciplines that will be encountered in the course of this work. Techniques and terms used in Managerial and Cost Accounting, Economics, the Behavioral Sciences, Computer Science and in the Management Information Systems disciplines are interspersed in this effort. Some prior understanding of these multidisciplinary ideas is assumed of the reader. In general the techniques are basic or easily understood from the references.

The methodology employed is straightforward. The research effort involved collecting information and relevant

cost data about and from the HRMSS, HRMIN and computer service companies. The cost comparison was laid out as specified in OMB Circular No. A-76.

D. ORGANIZATION OF THE THESIS

The thesis will be organized to present a reader-friendly document. First, a brief description of the Human Resource Management Support System and its information requirements will be presented. This will be followed by a description of HRMIN and why HRMIN is needed by the HRMSS. Next, a detailed cost comparison of in-house versus contract-out performance of HRMIN operations will be presented. Finally, the results and conclusions of the cost comparison will be presented along with any recommended actions.

II. THE HUMAN RESOURCE MANAGEMENT SUPPORT SYSTEM (HRMSS)

A. FOREWORD

As of today's writing the HRMSS is undergoing extensive structural and organizational revision. The intent of this revision is to improve the efficiency and effectiveness of the total system. These structural changes, in the opinion of the author, will not change the objectives of the HRMSS because the objectives were developed to comply with federal law, and Department of Defense and Navy policy.

This overview of the HRMSS contains information that is presently in force either by authoritative instruction or organizational structure. It is a snapshot of the HRMSS today. Conjecture about the finished look of the HRMSS is beyond the scope of this work. However, future developments may prove assumptions used in this study invalid for any similar study conducted in the future. It is the author's opinion that the present revision will take, at minimum, one year to accomplish.

B. ORGANIZATION

The purpose and objectives of the HRMSS existing today are taken from the Mission Element Needs Statement (MENS) for the Human Resource Management Information Network (HRMIN). The author and exact date of authorship is unknown.

The current Navy Human Resource Management Support System (HRMSS) grew out of the Human Resource Development project of 1971 and is described in OPNAVINST 5300.6B of 10 OCT 1975. The HRMSS is designed to implement federal law and Department of Defense and Navy policy in the areas of Human Resource Management (Leadership, Management Education and Training (LMET)), Organization Development (OD), Overseas Duty Support (ODSP), Equal Opportunity (EO), and Drug Abuse Control and Alcoholism Prevention. The HRMSS' objective is to assist in the achievement with the Navy of: improved unit readiness; improved leadership and management of human resources; improved personnel stability through retention; improved communications; improved Navy image; greater career satisfaction; demonstrated equal opportunity; increased overseas tour satisfaction and productivity; identification and reduction of drug and alcohol abuse; and increased responsiveness to both requirements and individual needs.

C. ORGANIZATIONAL RESPONSIBILITIES

The responsibilities delegated by the Deputy Chief of Naval Operations (Manpower) (OP-01), who is the HRMSS sponsor, are taken from the Management Consulting Report for the Navy Human Resource Management System (Naval Audit Service, 1982, p. 5) and are as follows:

1. The Director, Human Resource Management Division (OP-15), acts as the HRMSS coordinator. In that capacity, OP-15 plans, develops, coordinates, and controls policies and Navy-wide operations concerning achievement of Department of Defense, Legislative and Executive Department HRM requirements. Specific functions include the following:

    a. Establish HRM Support System objectives, determine time-phasing and support requirements, evaluate progress and applicability of all HRM elements, and collect and assess HRM Support System evaluation data.

    b. Provide policy coordination with all second echelon commanders to ensure full implementation of the HRMSS throughout the Navy.

c. Ensure full compliance with Navy HRMSS requirements by providing support and exercising technical control over system design, implementation and Navy-wide application.

d. Control and coordinate Human Resource Management Center (HRMC) Washington, DC, operations in support of shore establishment requirements.

2. The Director, Human Resource Management Operations Division, Naval Military Personnel Command (NMPC-6), provides direction and management coordination to HRMSS personnel, programs and policies. Specific functions include the following:

a. Provide technical management of Human Resource Management, Equal Opportunity/Race Relations, Drug Abuse Control and Alcohol Prevention elements.

b. Establish research objectives and conduct evaluation in support of HRM.

c. Conduct technical inspections of Human Resource Management Centers and Detachments (HRMC/Ds) in order to ensure that program implementation is in compliance with policy and intent of the HRMSS.

d. Monitor manpower authorizations and transactions concerning HRMSS billets and make recommendations to the Chief of Naval Personnel and Chief of Naval Operations to ensure adequate personnel resources are allocated to accomplish system objectives.

3. Fleet Commanders-in-Chief. Fleet CINCs ensure that HRM programs are implemented, supported, and maintained in all commands under their cognizance. Specific functions include:

a. Exercise management control over assigned HRMC/Ds.

b. Monitor HRMSS programs to ensure that they fully support and are relevant to fleet requirements.

c. Provide recommendations to CNO for policy or program modifications which may be required to attain greater program responsiveness.

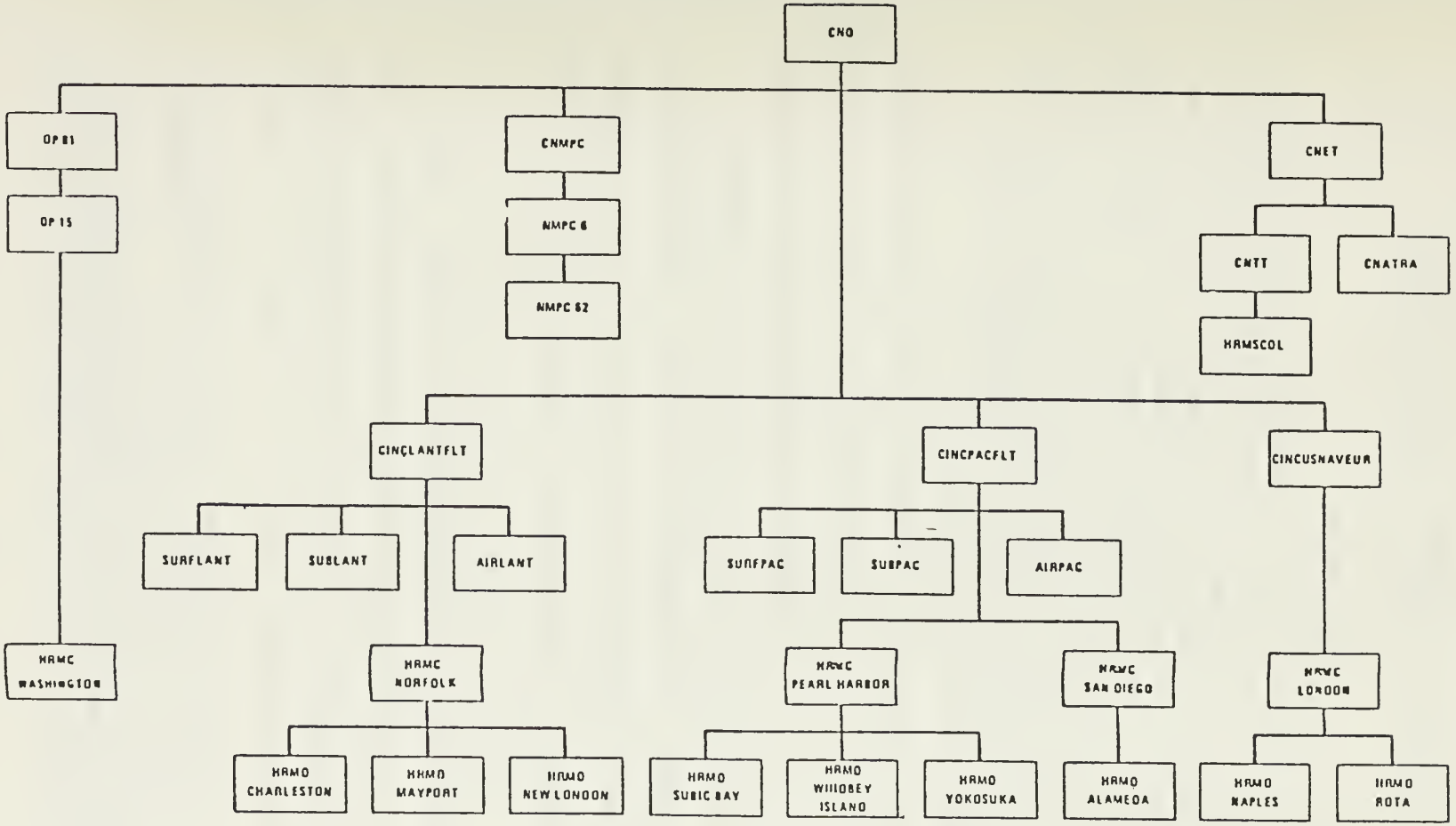
4. Commander in Chief, U.S. Naval Forces, Europe (CINCUSNAVEUR). CINCUSNAVEUR makes HRMC/D services available to all subordinate commands and activities

including those which are under CINCUSNAVEUR operational control.

5. Chief of Naval Education and Training (CNET). CNET is responsible for development and evaluation of training programs in support of HRM.

The present HRM organization consists of a field system of five centers (HRMCs) and nine detachments (HRMDs) worldwide. In addition the system is supported by staffs or by personnel who have primary or collateral HRM duties at virtually every Navy organization. "The HRMSS is a worldwide organization [Figure 1] composed of over 1500 people." (McKinley, 1978, p. 13)

The objectives of the HRMSS as stated and the responsibilities of its managers is an impressive list. Assuming proper staffing, an efficient organization, and sufficient resources to accomplish the task (none of which can be assumed), it is the opinion of the author that nothing less than heroic efforts and massive good fortune would be required to come close to optimum accomplishment of its objectives. The stated objectives are to assist in the achievement of the desired human resource goals of readiness, retention, communications, and so on. They all involve the interaction of human beings in the Navy. Policies that affect human resource related areas will determine which way retention, readiness, drug usage, equal opportunity, and so on, will be headed. These policies are, and will be, decided by those in positions of authority in the Navy. It is up to



NOTE: OPNAV staff organizations and operating forces are displayed for graphic simplicity and do not indicate echelon order.

Figure 1.

Organizational Overview of the HRM Program

the Human Resource Management Support System to provide information and direction to these decision makers.

D. THE SCIENCE OF DECISION MAKING

> Praxeology is defined as the science of decision making. It is in contrast to the art of decision making. The latter is devoid of rational analysis and is associated with such phrases as 'born to leadership', 'has a natural gift for analyzing and solving problems', 'flies by the seat of his pants', or 'operates on hunches'. The art of decision making cannot be studied or learned. It refers to a philosophy which refutes or is ignorant of the application of science in management, and perpetuates the myth of an uneducated anti-hero who delights in outperforming his scientifically trained colleagues. (Buckley, Buckley, and Chiang, 1976, p. 51)

The task of science is to seek the meaning of things--to discover truth. It may be historically oriented as indicated by the question, What conditions caused the racial violence on the U.S.S. Neversail?; or, it may be contemporarily oriented, e.g., What are the problems being experienced by women assigned to sea duty?; or, it may be future oriented, e.g., What effect on retention will another round of uniform changes make?

The science of decision making can be studied and learned. It is hoped that all decision makers will internalize the concepts of this science for their own and their organization's good.

> Praxeology is a novice science. Unlike the physical or biological sciences, which have matured over thousands of years, the science of decision making is a twentieth-century innovation. Praxeology at this stage of its development does not claim to have supplanted the art of decision making. In fact this objective may never be

> reached, for there will always be areas in decision making which defy the probing of science. [The split-second combat decision is such an area.] Instead, the focus should be on the marginal utility of scientific management. (Buckley, Buckley, and Chiang, 1976, p. 51)

Examples of scientific management that the Navy can employ are: the use of forecasting methods in future planning; the adoption of a manpower planning and assignment model for more effective utilization of its human resources; the application of statistical sampling to its information gathering efforts; and the systematization of its information processes. Scientific management responds to two types of needs. The first is to find better solutions to traditional problems and the second is to solve new problems for which there are no traditional solutions.

The HRMSS is the headquarters of scientific management for all areas of effort involving human resources. The Director of the Human Resource Management Division, utilizing the principles of scientific management, has undertaken a project to systematize and automate the HRMSS information processes. The outcome of the project is today known as the Human Resource Management Information Network (HRMIN). An overview of HRMIN and its relation to management will be presented in Chapter III of this work.

E. SUMMARY

The HRMSS is the system utilized to improve the Navy's readiness by identifying and rectifying potentially

dysfunctional, personnel oriented situations. The area of concern is not mundane manpower considerations, like how many sailors are required to man 600 ships, but rather behavioral and social concerns. How a marginal increase in reenlistment rates can be generated by improving the leadership skills of the middle level managers in the Navy is an example of an HRMSS problem.

The HRMSS is a global organization whose output is information, whose input is information, and whose throughput (what it works on) is information. The HRMSS, like the telephone company, is in the knowledge business. Its operators (workers) must be conversant in Management Science, Behavioral Science, and normal bureaucratic operations. The acquisition of these skills and the processing of their work (information) is an expensive undertaking. A modern computer-based Management Information System is necessary to more efficiently and effectively conduct their business. These considerations make the need for building HRMIN a given. The political, bureaucratic oriented question of whether the Navy should build HRMIN is therefore unnecessary to address.

III. THE HUMAN RESOURCE MANAGEMENT INFORMATION NETWORK (HRMIN)

> The information we have is not what we want; the information we want is not what we need; and the information we need is not available. (McKinley, 1978, p. 1)

A. FOREWORD

In order for the HRMSS to carry out its objective it is necessary for management to be in control.

> Control is a management function which monitors system performance, provides management feedback, and maintains input, throughput and output variables within prescribed limits consistent with organizational plans and objectives. The purposes of management control are: (1) to assure the timely and proper implementation of program plans, (2) to maintain system inputs, processes and outputs within prescribed limits, and (3) to achieve the optimum balance between organizational effectiveness and efficiency. Planning and control are interdependent functions. Planning without control is of very limited use. Control without planning is impossible. (Dewing, 1979, p. 81)

The lifeblood of any control system is information. Information is defined as:

> the interpretation of data to provide meaning by an individual; a tangible or intangible entity that reduces uncertainty about a state or event. (Lucas, 1982, p. 497)

Information is systemic.

> An information system is a set of organized procedures that, when executed, provide information to support decision making and control in the organization. (Lucas, 1982, p. 8)

Information systems are either manual or computer-based. The focus of this chapter is on the Human Resource Management Information Network, hereafter referred to as HRMIN. It is a

computer-based Management Information System (MIS) which is constructed using network technology. Computer networks are derived from a combination of computers and telecommunications. HRMIN is a collection of remote teleprinters of microcomputers connected as nodes on the Tymnet, a computer communications network. One of the nodes is the central processing unit, the HRMIN minicomputer. The effective configuration is a star as shown in Figure 2.

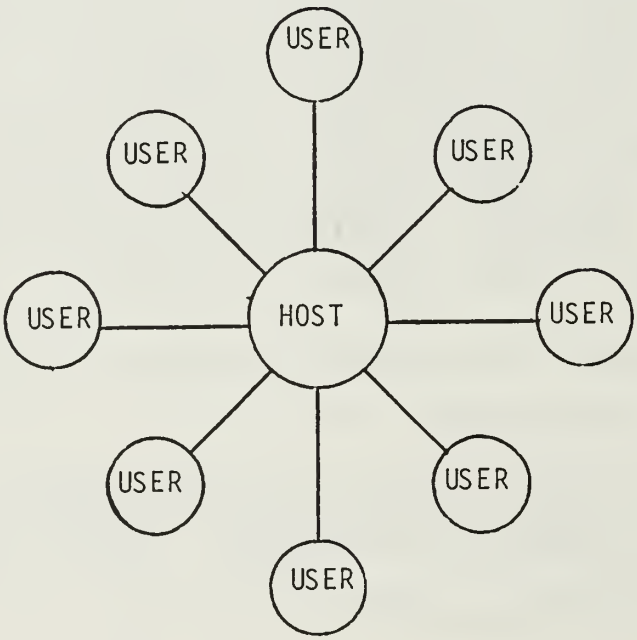


Figure 2.

Effective HRMIN Network

Tymnet is a commercial computer network that functions to provide telecommunications capability to any organization desiring to form a network. It is a worldwide organization

and effectively meets the needs of HRMIN at about one tenth the cost of the military ARPANET. ARPANET costs, based on information supplied by the HRMIN System Manager, would be approximately $35,000 a month. The November 1982 Tymnet bill was approximately $3,500. The real HRMIN network configuration is shown as Figure 3.

In addition to the present network, it is planned to eventually connect the European and Asian Centers and Detachments to the system (refer to Figure 1.). It is not the purpose of this work to explore network technology. Numbers of works on the subject are available. Tanenbaum (1981) and Davies (1979) should be referred to for further technical information.

Now that a general picture of what HRMIN looks like has been presented, it is important to this work to know how HRMIN came to be what it is today.

B. HISTORICAL PERSPECTIVE

As stated previously, the HRMSS requires and processes a vast amount of information. Unfortunately, to date, the information can be described by the opening quote of this chapter. McKinley (1978, p. 1) stated:

> Headquarters in Washington, D.C., is often faced with the dilemma of not having the necessary information at hand. Or, the information may not be readily available or in the right format to allow timely responses to the Chief of Naval Personnel, the Chief of Naval Operations, the Department of Defense, Congress, the HRM field activities, or for questions posed by the program sponsor or program manager.

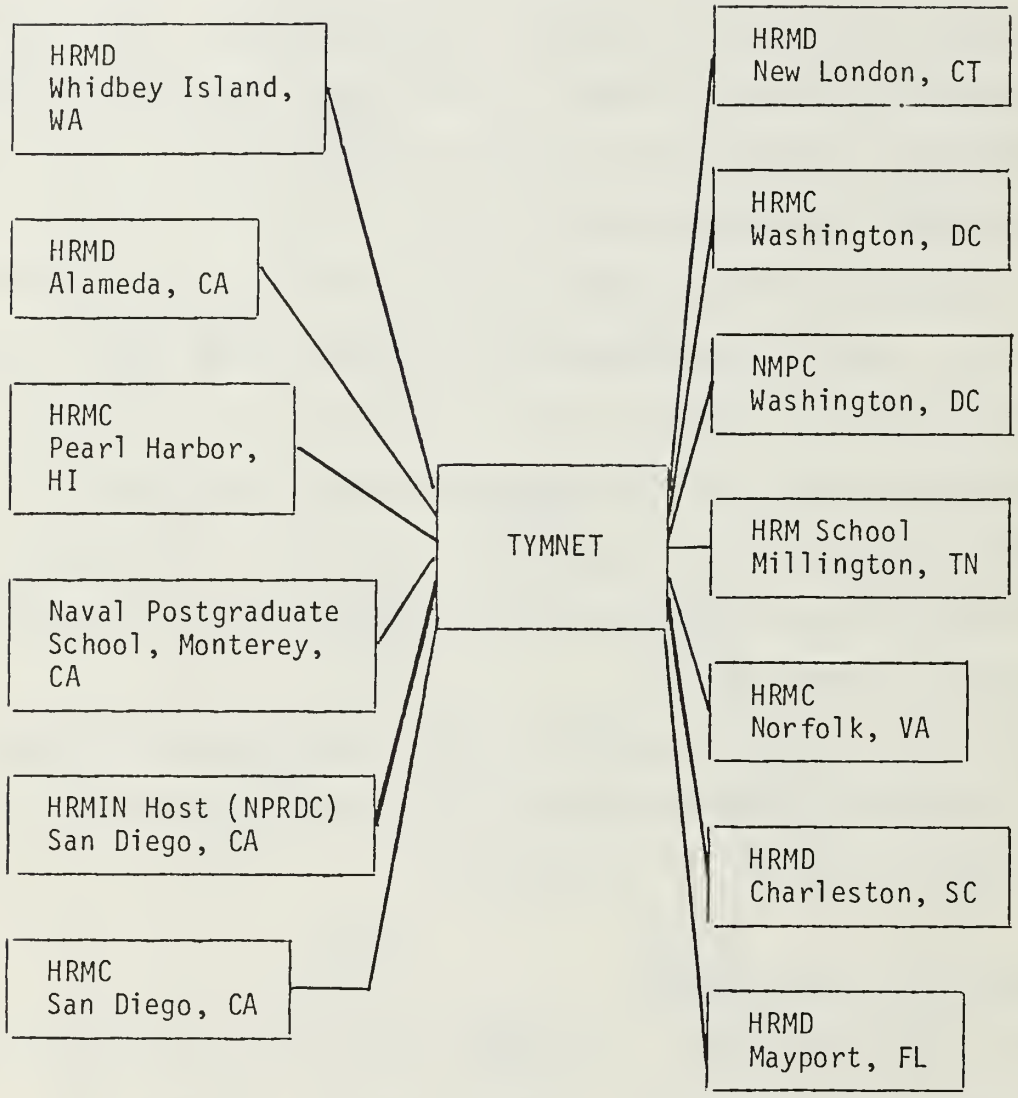


Figure 3.

Real HRMIN Network

Some such questions are, for example: How effective is your operation?; What are the benefits versus the cost of the system? (Naval Audit Service, 1982); How are your resources being utilized?: and so on. In addition, field activities require analyses of various types of data to expedite their efforts. For example, research was recently conducted using HRM Survey responses to supervisor leadership trait questions. These responses were cross-tabulated with attendance information from Leadership Management Effectiveness Training (LMET). The results showed statistically significant, higher responses about supervisors who had attended LMET than for those who had not (Thomas, 1983).

> In early 1978, the HRM Program Manager's Evaluation and Management Information Office (NMPC-6C) and the Navy Personnel Research and Development Center (NPRDC) undertook the task of analyzing these management information needs, proposing a solution, and developing a workable system to meet these deficiencies. (McKinley, 1978, p. 3)

Four separate automated systems were found that were managed by three separate offices. In addition,

> pockets of information in the HRMSS maintained by various methods, usually on flat paper, were found as analysis of the problem progressed. The four existing systems included: (1) the HRM Survey data bank at NPRDC...; (2) the Navy Drug Rehabilitation Center (NDRC) data system...; (3) the Navy Alcohol Rehabilitation Center (ARC) data system...; and (4) the Navy Alcohol Safety Action Program (NASAP). The four systems were using three separate commercial computers to store and process their data. (McKinley, 1978, p. 3)

The plan was to develop a single HRM data bank that could potentially cross link all three systems. This plan was submitted to the Assistant Chief of Naval Personnel (ACNP)

for Financial Management and Management Information for review. In August 1978 the ACNP approved establishment of HRMIN (Chief of Naval Personnel, 1978). The approval was provisional. It decided not to consolidate the other three programs at that time. So, in 1978 HRMIN was designed to be an HRM Survey database system to service the system's claimants and sponsors.

> ...additionally, although not officially part of the mission, the Human Resource Management Centers in London, Norfolk, San Diego, and Pearl Harbor attempted to develop individual capabilities for analysis of aggregated HRM Survey data. (McKinley, 1978, p. 5)

The tools to effectively analyze their own data were added to HRMIN. The set of tools is primarily the Statistical Package for the Social Sciences (SPSS). SPSS is a very comprehensive package of statistical programs that can be used to do almost any type of research analysis. However, it can be very complicated to use if cause and effect answers are required of users.

In June of 1981 an NMPC-6 memo (Naval Military Personnel Command, 1981) formalized the understandings between NMPC-6 and NPRDC with respect to the requirements of SECNAVINST 5231.1A (Secretary of the Navy, 1979), "Life Cycle Management of Automated Information Systems (AIS) in the Department of the Navy."

The Life Cycle of an AIS is composed of five phases:

1. Mission Analysis/Project Initiation
2. Concept Development
3. Definition Design

4. System Development

5. Deployment/Operation

As of today HRMIN is near the end of the fourth phase (refer to Appendix A for a graphic representation of the functions of system development with respect to the five phases).

C. HRMIN TODAY

In addition to data analysis via SPSS, HRMIN has incorporated a Database Management System which can automate HRMSS recordkeeping and file maintenance tasks. It can also standardize and expedite report generation and submission, as well as nearly anything else the user can envision. Another feature of HRMIN is an electronic "mail" system. This allows essentially instantaneous message and correspondence handling. Finally, HRMIN is capable of all the things any other general purpose minicomputer is capable of, such as an editor to build and modify files and special purpose programs (MACROs) to do its required tasks. These special programs process the Survey data and allow the user a user-friendly means of accessing the database. As stated, the present primary task of HRMIN is that of a remote access, HRM Survey database, research computer. An overview of the HRM Survey and what HRMIN does with it is provided as Appendix B (Navy Personnel Research and Development Center, 1982, p. 1B-01).

The network as described uses many types of devices as remote terminals. There are teleprinters, microcomputers,

word processors which have communications capabilities, and graphics capable (PLOT 10) facilities for those who need them. The focus of this work is on the host site operation. (Host is a term in general use that originates with the first computer network, the ARPANET, and its related costs.) The user installations, their operational costs, and methods of use are not germane to this study and will not be detailed further.

For those who understand computer systems the specifics of HRMIN are as follows. The HRMIN minicomputer is a HARRIS model 135/6 which was introduced in May of 1976. It is a high-performance, disc-based, vertical memory computer system for performing concurrent time-sharing, multi-batch, remote job entry and real-time processing. It has been expanded to a four-disc drive configuration capable of 1.2 gigabytes of memory. For a more detailed description of this machine refer to Datapro Research Corporation's report on minicomputers (1982, p. M11-468-201-207).

1. New Capabilities

HRMIN's capabilities are being expanded to incorporate current Equal Opportunity (EO) data requirements. This capability when complete will utilize the remote job entry (RJE) capabilities of the system and, with the exception of an operator to load new data, will not affect the operation of the host site. This operator is accounted for in the Cost Analysis chapter of this work. A detailed

study of this use for HRMIN was conducted by Booz-Allen and Hamilton (1980).

Another new capability that is about to become a standard function of HRMIN is the standardization and generation of all HRM operations report requirements. HRMIN, utilizing its resident Database Management System (INFODBMS), will allow all HRMIN capable activities to enter all required operations report data in a user-friendly manner. Then, when the required reports are due, a standard formal report can be generated in a minimum amount of time. This capability is presently under development (Bossart, 1983; Booz-Allen and Hamilton, 1982).

The capabilities of a computer-based management information network are only limited by the imagination of the users and the capabilities of its software. There are many possible applications of HRMIN. A brief discussion about some of the future capabilities is appropriate at this point to give the reader a feel for the potential value of this network.

D. HRMIN TOMORROW

HRMIN is a very capable computer system. Computers are capable of replacing conventional information processing tasks for almost any organization. Toffler (1980, p. 186) predicts "the death of the secretary." He foretells an increase in administrative productivity and a decrease in

cost by utilizing word processing computers. HRMIN has this capability today. TIME magazine (Friedrich, 1983, p. 18), in an issue that is devoted to the computer in lieu of its normal Man of the Year issue, quotes Argues Harold Todd, executive Vice President at First Atlanta Bank:

> Managers who do not have the ability to use a terminal within three to five years may become organizationally dysfunctional.

This author contends that this generalization is true and in some organizations, three to five years is too long a time period. HRMIN will require this ability of HRMSS managers in the future.

Some specific potential capabilities that could make the HRMSS more productive are gleaned from interviews with the HRMIN System Manager, the HRM research psychologist at NPRDC, a sample of present or future users, and the thoughts of the author.

First, the HRMSS is a data gathering and information dissemination organization. A large part of a Center or Detachment's job is the facilitation of workshops that are deemed necessary from the diagnosis phase of the HRM cycle. It is a frequent occurrence for HRM Specialists to re-invent already existing workshops to fit the needs of a Navy command. The HRMIN could be used as a reference library for workshops that had proven successful before. The actual documents could be stored on the computer for hard-copy access by any user.

Second, the Overseas Diplomacy Support Program (ODSP) provides information to Navy members who are deploying to foreign countries or who are relocating with their families to foreign shore duty. Computer access to the most recent ODSP information would enhance the effectiveness of this program.

Thirdly, a connection to a computer-based library search system such as the one operated by the Lockheed Corporation would be invaluable for researchers. This would be a reference system for the Centers, Detachments, and for research being conducted at the Naval Postgraduate School. In the same vein, a reference library of existing Human Resource Management literature and abstracts of current research efforts would be of great value to the HRMSS.

The Program Manager could use the Database Management System to keep track of personnel management concerns. For example, a file that contains information on those Navy personnel whose education or experience make them candidates to fill HRMSS billets could be maintained. This would help provide the quality personnel necessary to fill these jobs.

The ability to link to other computer systems could have a positive payback. For example, analyzing the Federal Government's National Drunk Driver Network could potentially, by cross-checking military records, provide the drug and alcohol portions of the HRMSS with a list of new clients.

A final thought concerning the potential of HRMIN is its utility to the Naval Postgraduate School (NPS). NPS has a

Master of Science in Management program that emphasizes the Behavioral Science discipline of Organization Development (OD). The students study research methods, statistics and the use of SPSS. Thesis research, utilizing the HRM Survey data bank, would provide very valuable answers to many questions in the realm of human resources. An upgrade of present equipment at NPS to allow remote access to HRMIN and a subsequent transfer of created files back to NPS would be invaluable to HRM thesis research efforts and save the cost of providing multiple HRMIN terminals for student use.

The word "value" has been applied to this discussion of HRMIN. Before leaving this overview it is important to examine this concept and how it applies to HRMIN. Websters New Collegiate Dictionary (1976, p. 1292) defines value as "the relative worth, utility, or importance of."

E. WHY HRMIN

HRMIN is a Management Information System (MIS). The literature that examines the technical nature of MISs becomes outdated as fast as the hardware, software and application techniques that were "in" at the time of publication. In reality the field is changing so rapidly that articles can be old as soon as they are published. The basic concepts remain valid, however. Gorry and Scott Morton (1971) have constructed a framework that classifies MISs by function: (1) operational control; (2) management control; and

(3) strategic planning; and by structure: (1) structured; (2) semistructured; and (3) unstructured. For example, a structured management control job for HRMIN is the construction and generation of operations reports (refer to Appendix C for a graphic example of their framework (Lucas, 1982, p. 46)). The feeling that there is a preoccupation with MISs by managers (Ackoff, 1967) is probably still valid today. Dearden (1972) expands on the idea that a single, integrated system cannot be devised to fill all of management's information needs. This is also probably still valid today. Levitt and Whister (1958) and Rockart (1979) discuss the question of how upper management can identify and procure information from the MIS that is important. All of these issues are still germane to MISs.

1. MISs and Time

The major questions faced by managers who use information is, then, Why should I expend the resources to automate the information system? The answer lies in what an MIS hopefully will do. Krauss (1970, p. 8) presents this partial list of what an MIS may help bring about.

1. Render faster decisions.
    a. Detect and authenticate opportunity.
    b. Identify and isolate problems.
    c. Define and analyze situations.
    d. Evaluate and appraise alternative courses of action.

2. Accomplish more in the available time.

    a. Think more deeply about the situations.

    b. Ponder other variables.

    c. Gauge and contemplate ramifications.

    d. Investigate more alternatives.

3. Make a more thorough analysis.

    a. Review more meaningful information.

    b. Obtain a better collection of relevant viewpoints.

    c. Use advanced management techniques; that is, methods of operations research.

    d. Simulate more conditions.

    e. Ask and examine more questions, particularly the "what if" type.

The central point of this list is time--the time made available by computer processing.

2. Real-Time Management Control

> Information increases in value to the degree to which it enables management to decrease the time required to exercise control. Value also increases to the extent that information permits more effective, higher quality decisions. (Krauss, 1970, p. 9)

Control as defined earlier in this work is the cornerstone of effective management.

Figure 4 shows management control as a function of time. Krauss (1970, p. 9-11) discusses this concept. He states:

> A key objective of a system of controls is to minimize the time between the point at which a condition goes out of control and the point at which a correction is successfully executed. Measurement is a continuous function in a system of management controls. After an out-of-control condition

occurs, there is a passage of time during which the detection of this condition takes place....This is made known in the form of a communication of some type.

When information concerning the out-of-control condition has been disseminated a situation analysis takes place, again over some time interval. Following this, there is typically additional communication with one or more key managers, who render a decision as to the best course of action for rectifying the situation.

Further communication is required to notify appropriate individuals as to their responsibilities in carrying out the decision. This plus setup time (if any) takes place over still another time interval. Finally, the wheels are set in motion to execute corrective action, which of course also takes place over some period of time.

These seven stages, illustrated in [Figure 4], exclusive of measurements, constitute the management control cycle, or to put it another way, the react and rectify time....

...Often, shortening the management control cycle permits substantial economy and other benefits to be realized.

It is under these conditions that well-conceived real-time MISs can be overwhelmingly effective. In every management control system function (measurement, detection, communication, situation analysis, decisionmaking, and executive corrective action), computer-based real-time systems can permit time-interval compression.

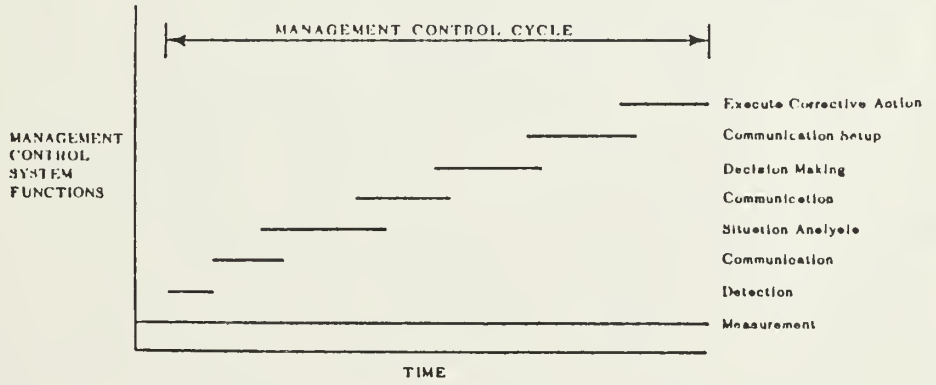


Figure 4.

Management Control Cycle

This time cycle varies greatly depending on what is to be accomplished. In the HRMSS, out-of-control people problems are time sensitive. Out-of-control human resources in the Navy are analogous to an infection in the body. If it is detected and cured early, nothing significant will happen. If undetected or too much time elapses before the condition is treated, massive attention and potentially harmful remedies may be required.

3. Benefits of MISs

Krauss mentions other benefits besides time economies. The benefits of having an information or, more specifically, a computer-based Management Information System, are difficult in most cases to specify. There are some trivial cases where benefit can be stated. For example, it is surely a benefit if manpower reductions due to automation save more in salaries than the system costs. Quantifying the value of information to a manager, however, is not so easy.

In most discussions of benefit the term "cost" comes along with it. This has resulted from the techniques of cost-benefit analysis of the Operations Research or Economics disciplines. One approach to measuring benefit and cost in management and information systems was devised by Bearfoot and DiGalleonardo (Navy Personnel Research and Development Center, 1974). It uses the Behavioral Science methods of measuring satisfaction or utility. It measures perceived rather than demonstrated effectiveness. The benefit portion of this work is germane to this chapter.

The approach formulated to assess benefit in management and information systems postulates three benefit factors:

- Potential Contribution (P)--This is a value attached to the information on the basis of some predetermined set of specifications that the information should meet.

- Received Value (R)--This is the portion of potential contribution that is normally received by users of the information.

- Utilization Value (U)--This is the portion of received value that users are normally able to actually apply in performing their functions.

The model relating these three factors is multiplicative as follows:

Realized Value	=	Potential Contribution	x	Received Value	x	Utilization Value
(a scale)		(a scale)		(a percent)		(a percent)

(Navy Personnel Research and Development Center, 1974, p. 10)

This method as stated measures perceived effectiveness or value. This perceived Realized Value and the value of time compression are, in the opinion of the author, the major reasons that managers opt to develop a computer-based MIS. It is also the opinion of the author that these reasons were the driving force for the HRMSS managers to undertake the development of HRMIN.

This chapter has presented the case for HRMIN. The answer to the questions, Should we or should we not develop HRMIN?, is not discussed because, as mentioned earlier, the decision was already made to develop HRMIN. The need for the development was a political decision. This type of decision makes the "yes" or "no" question a given "yes." The remaining questions, and the central question of this thesis,

are therefore analyzed in Chapter IV of this work. The question is: Is the present in-house application of HRMIN in accordance with Executive Department policies as specified in OMB Circular A-76, or should the in-house application be converted to a civilian contractor?

F. SUMMARY

The Human Resource Management Information Network (HRMIN) is a computer-based Management Information System (MIS) under development by the Human Resource Management Support System (HRMSS) Program Manager and the Navy Personnel Research And Development Center (NPRDC). It is a network of worldwide users, utilizing a "host" minicomputer which at present is located at NPRDC, San Diego, California. The development project was undertaken by the sponsors to take advantage of the time compression capabilities of a computer system and to attain the perceived value to management of such a system.

In the opinion of the author, the decision to develop HRMIN was driven by the desires of the sponsor to meet the aforementioned ends. HRMIN was needed and therefore there was never a quandary in deciding to develop HRMIN. It was instead a question of identifying the best system to meet the needs.

> The decision to develop HRMIN was based on economic considerations that were in effect at the time of that decision. (Rahilly, 1983)

Based on the policies in effect today the economies of the in-house versus the contracting-out decision requires examination.

IV. COST COMPARISON

A. FOREWORD

A cost comparison is a form of economic analysis. Such analyses are used in two ways:

> to assess the economic consequences of a decision already made, or as part of the decisionmaking process in the first place. The distinction lies in the relationship of the analysis to the planning and decision process [as suggested in Figure 5.]. (Naval Data Automation Command, 1980, p. 1-2)

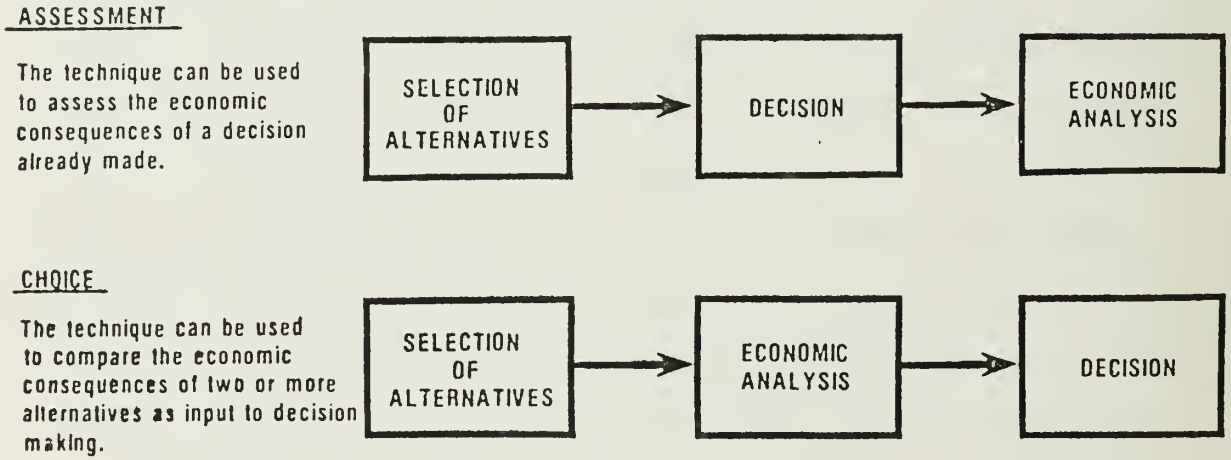


Figure 5.

Uses of Economic Analysis

The cost comparison that makes up this chapter is of the first case. The model that is used for this comparison is as specified in Office of Management and Budget (OMB) Circular No. A-76, Revised of 5 April 1979. The title of this circular is Acquiring of Commercial or Industrial Products and Service Needed by the Government; Policy Revision.

The purpose of this comparison is to assess the decision to develop HRMIN as an in-house system. The decision for in-house development has set the groundwork for in-house operation. Although no real decision regarding operational residence has been made, the inertia of the present development process will, in the opinion of the author, make the decision moot because in-house operation will be a fact as operational status begins and HRMIN is still at NPRDC.

A Booz-Allen and Hamilton study (1981) assessed various site location possibilities. Three alternatives were examined. Two in-house alternatives were looked at as well as a commercial timesharing alternative. The in-house alternatives were similar. Differences were due to site unique costs and situations. There are many issues that will drive the final location decision. Some key issues are:

1. NPRDC developed the system and has the corporate knowledge to smoothly run the system.

2. The software was written in-house at NPRDC. This would suggest minimum maintenance problems if HRMIN is left at NPRDC.

3. No conversion costs would be required, and no user interruptions would occur if HRMIN stayed at NPRDC.

4. The present NPRDC administration is desirous of being pragmatic about its mission. It believes that research and development must complement fleet support. Therefore it is in the process of setting up an NPRDC Fleet Support Branch. This operation would or could provide the right conditions for HRMIN operational life. (Thomas, 1983)

5. NMPC does not possess the expertise on its staff to manage the operation of HRMIN. Therefore a new location and management by NMPC would require a long transition period. (Booz-Allen and Hamilton, 1981)

The mentioned study established criteria to evaluate the alternatives. The criteria and the order of their importance were established by the Program Manager and the users of HRMIN. They are:

1. System Performance and Reliability

   System performance was defined as how well the system supports and performs the function of the application running on it....System reliability was defined as the ability of a system to provide dependable support on a continuous basis (90% up-time and a back-up system).

2. System and Data Security

   Security was defined as providing an acceptable level of protection against unauthorized access to the system and to HRM Survey data.

3. Management Control

   The key management control factor for any alternative is the ease with which the sponsor can monitor the performance of the system and if necessary re-direct the management or content of the application so that the plans or objectives for the system are effectively used.

4. Maintenance and Operational Support

   The fourth evaluation criterion was the ability of the managing organization at the location to provide adequate personnel resources for the maintenance and operation of the system hardware and software.

5. Cost

   Cost was the final criterion used to evaluate the alternative locations. (Booz-Allen and Hamilton, 1981, p. 3-5)

The three alternatives examined were: (1) NPRDC; (2) moving the application to the Naval Postgraduate School Computer Center; and (3) a timesharing application.

Figure 6 displays the results of this study using these criteria. It indicates the timesharing alternative is

EVALUATION * CRITERIA	ALTERNATIVE LOCATION		
	1 NPRDC	2 NPS	3 TIME-SHARING
SYSTEM RELIABILITY AND PERFORMANCE			
SYSTEM AND DATA SECURITY			
MANAGEMENT CONTROL			
MAINTENANCE AND OPERATIONAL SUPPORT			
COST * *			
RATING LEGEND	 LOW MEDIUM HIGH		

*CRITERIA ARE IN DECENDING ORDER OF IMPORTANCE TO THE NAVY PERSONNEL INTERVIEWED

**A HIGH RATING FOR THIS CATEGORY MEANS LOWER COSTS; HIGH IS COST-BENEFICIAL.

Source: Booz-Allen and Hamilton, 1981, p. 51.

Figure 6.

Alternative Location Summary Assessment Matrix

superior with the exception of cost. Even though cost is the least important criteria, the five times higher cost for the timesharing over in-house caused the study conclusion to recommend NPRDC as the place to allow HRMIN to transition to an operational system (Booz-Allen and Hamilton, 1981). This recommendation and the issues mentioned will make NPRDC the prime candidate for HRMIN operational residence.

Based on the Booz-Allen and Hamilton study outcome the number one and two alternatives will be compared to attempt a resolution of which alternative is the least costly alternative to the taxpayer. The method of cost comparison will be examined next.

B. OMB CIRCULAR NO. A-76 (5 APRIL 1979)

1. Purpose and Background

> This circular establishes the policies and procedures used to determine whether needed commercial or industrial type work should be done by contract with private sources or in-house using Government facilities and personnel. This circular replaces OMB Circular No. A-76 dated August 30, 1967 and all subsequent amendments.
>
> In a democratic free enterprise economic system, the Government should not compete with its citizens. The private enterprise system, characterized by individual freedom and initiative, is the primary source of national economic strength. In recognition of this principle, it has been and continues to be the general policy of the Government to rely on competitive private enterprise to supply the products it needs. (Office of Management and Budget, 1979, p. 2-557-8)

There are three precepts of this policy. First, the Government's business is not to be in business. Second,

certain functions are inherently governmental in nature and therefore mandate performance by federal employees. Third, the American people are entitled to economy in Government. In other words, if the Government wants a job done that is not inherently governmental, and a public sector organization is capable of doing it, a cost comparison must be conducted to identify the method (in-house or commercial) that is the least costly to the taxpayer.

The cost comparison methodology of this circular looks at various situations. The question of this study is, simply stated, Should the existing Government activity (HRMIN at NPRDC) be continued in-house or converted to a contracted-out situation? The flow chart in Appendix D demonstrates the sequence of actions to be accomplished to implement the circular policy. The cost comparison methodology is detailed in the circular, however, reproducing it in this study will not be attempted. For any examination of the specific details of the handbook that the reader requires, the referenced circular should be examined. Before developing this comparison the scope of, and the assumptions used in, this work must be presented.

C. SCOPE

The cost comparison will be structured to account for all pertinent costs that will be affected by an alternative selection. The costs related to management and operation of

the system, such as manpower and overhead costs at the Program Manager's location and at user sites, will not be considered.

The cost comparison will use the framework specified in OMB Circular A-76. No attempt to reconcile this framework with Capital Budgeting Theory will be undertaken.

It is assumed by the author that there will be no differences in cost acceleration between alternatives. Inflation and the relative differentials in cost elements between each alternative will remain constant for each alternative. It is also assumed that the current system requirements will not change over the system life (probably an unreasonable assumption). Based on these assumptions the cost comparison will be presented for the base year, Fiscal Year 1982, only.

Actual cost data for the present HRMIN operation were obtained from the NPRDC Comptroller and from the HRMIN System Manager. A user profile was postulated using information obtained from the HARRIS minicomputer job accounting feature and from information supplied by the System Manager. It was assumed that this information was accurate and representative of normal system utilization.

Based on this postulated profile, the timesharing service costs obtained in the Booz-Allen and Hamilton analysis (1981) were adjusted to attempt to generate a more accurate set of costs. Appendix E is from this analysis.

The low bidder is not considered because it is assumed that Optimum Systems, Incorporated's total cost is a "buy-in" quote. Thus, Tymshare and Mainstream EKS of Boeing Computer Services are examined in this analysis. These cost data were adjusted using the Teleprocessing Services Programs (TSP) Authorized Schedule Price for Fiscal Year 1982. The TSP price list used was for Tymshare and was obtained from the General Service Administration in San Francisco. The 1982 prices for connect time were used. It is assumed that the Tymshare and Boeing charges are the same.

The lowest cost schedule was utilized. All other costs were assumed to be the same as Fiscal Year 1981 costs. The costing method used for Appendix E was benchmarking.

1. Benchmarking

Benchmarking is the term applied to the method of evaluating potential vendors during the competitive procurement of computer services. A benchmark is a mix of requirements that is representative of the user's projected workload over the life of the system. Mandatory and desired specifications are presented to bidders in a Request for Proposal (RFP). Such things as data storage requirements and software requirements are examples of these specifications. In addition, programs to test specific user requirements are part of the benchmark presented to the vendors. The potential clients then do the benchmark job and are graded using a scheme devised by the proposer. Based on this

benchmark, the vendors will specify the cost to provide the services desired (Gurian, 1982). Competitive bidding and negotiations skills can greatly affect this cost (Aver and Scoggins, 1977).

The implication of this discussion is that large differences in contract prices can be driven by the negotiations in an actual competitive bidding. This is a serious limitation of this analysis. Further information on benchmarking can be found in Benwell (1975).

D. ALTERNATIVE ONE: HRMIN AT NPRDC, GENERAL

The almost-ready-to-become-operational HRMIN is presently housed in a barracks-type building at NPRDC. It receives funding from NMPC-6, the system sponsor. At present, labor costs are generated by the proration of time that NPRDC personnel spend working at HRMIN-related tasks.

A GS-12 Computer Specialist acts as the System Manager. He spends one-half of his time on HRMIN-related work. A GS-7 Programmer is employed essentially full time in HRMIN-related work. Additional help during the development phases was contracted out to various operations. Primarily computer science students from San Diego State University are employed part time to perform programming tasks and related work. It must be noted that these students have been an apparent bargain to this effort (they were hired at about the GS-5 level). There is also a Research Psychologist employed part

time in HRMIN work. The present labor cost picture would have to change with the full operation of HRMIN.

Realistic personnel requirements were discussed with the System Manager (Rahilly, 1983). They are:

1. System Manager, GS-12/1, full time;
2. Analyst/Programmer, GS-11/1, full time;
3. Computer Operator, GS-7/1, full time;
4. Research Psychologist, GS-15/1, full time.

It is assumed that the other cost elements will remain unchanged if HRMIN remains in-house at NPRDC. They include the charges for various overhead items such as security, utility consumption, rent, fire protection, and so on. NPRDC allows economies of scale of the HRMIN operation by allowing it to function as a tenant operation.

E. ALTERNATIVE TWO: COMPUTER SERVICE BUREAUS, GENERAL

> 'Computer services' or 'remote computer services' is the new term for timesharing of service-bureau operations. (Whieldon, 1980, p. 38)

This service is a rapidly expanding portion of the national economy. Its potential to a customer takes many forms. Depending on the job to be performed, it can in many cases be a very cost effective means of accomplishing data processing. There are many works in the literature that address the industry. Mitchell (1976) and Dooskin (1980) are representative of these works.

1. Typical Charges

Several factors are relevant in analyzing timesharing costs for the individual user. Vendors base charges for their services on all or a combination of the following factors:

1. Connect time to the computer--the duration of an active transmission link between the user's terminal and the timesharing system.

2. CPU time [Processing]--the period a program occupies the central processing unit.

3. Storage capacity--required for the user's programs or data files.

4. Channel time--the duration of channel use sometimes measured by counting the number of I/O requests.

5. Additional charges [Other]--may be made for file access, languages, applications programs, and terminal and communication equipment rentals. [Ex: SPSS royalty fees] (Hagin and Mader, 1979, p. 316)

2. Typical Benefits

Benefits are the outputs expected for costs incurred. The term 'benefits' in this usage is synonymous with results, utility, effectiveness, or performance. (Naval Data Automation Command, 1980, p. 6-1)

Benefits are by their nature more intangible than costs and therefore difficult if not impossible to quantify. The benefits of computer service work vice in-house capabilities can be described as above. An example of one analyst's initial listing of benefits for contracting a computer service organization are:

1. Fewer programming errors;

2. No training required;

3. Known costs;

4. No equipment maintenance (and other logistic support);

5. Minimum personnel problems;

6. Increased experience and capability for future expanded efforts;

7. Greater capability for handling varying workload. (Naval Data Automation Command, 1980, p. 6-4)

3. Typical Disadvantages

With the benefits of a decision or operation there are always some disadvantages. Hagin and Mader (1974, p. 315-316) list some of these for timesharing contracts:

1. Timesharing is needlessly expensive for users who do not benefit from quick responses or who have a high volume of transactions. Most keyboard terminals have limited speeds, which increase communications charges if there is much data transmission. Although remote batch processing reduces these charges, it increases turnaround time to minutes or hours.

2. Timesharing introduces considerable overhead that users must ultimately pay for. The split-second choreography required for multiple users necessitates a costly operating system. Communications costs may also be considerable versus on-site I/O. Finally, when timesharing is vended by an outside commercial firm there are added charges to cover marketing, administration, taxes and profit.

3. Usage can be delayed from minutes to hours because of telephone line or computer difficulties. In general, timesharing systems are relatively sophisticated with the resultant hazard of technical problems.

4. Data security problems are accentuated by timesharing. For example, retrieving list data may be difficult because of systems' dynamic interactions. The user must therefore consider safeguarding all programs and data with copies. Similarly the vendor should install software and access procedures that prohibit unauthorized trespassing on others' property.

The presentation of costs, benefits, and disadvantages is pertinent to all potential service vendors. Size and technical sophistication relative to their competitors, familiarity with government work, discounts

given to government, the philosophy of the marketing structure, ploys used to negotiate contracts, hunger for business and the accuracy of their own internal capability to predict costs are all reasons why different vendors may ask different amounts for the same apparent tasks. Exact explanations for different contract prices therefore cannot be given.

For the purpose of this analysis two sets of numbers will be used to represent the contract price quotes of the service bureaus. Tymshare (most expensive) and Mainstream EKS (least expensive) will be adjusted using the assumptions previously stated. The less costly alternative will be compared to the in-house costs.

According to Booz-Allen and Hamilton (1981, p. 47), application, relocation and loading are often performed free of charge by vendors. The work would probably take about a man-month of labor at a cost of about $6,000 to accomplish the set up and debugging. This is assumed true because the software presently in use for HRMIN is standard and transportable to most operating systems. (Rahilly, 1983)

The remaining costs that will be considered for the alternatives are the costs of maintaining a System Manager and an Analyst/Programmer at the contractor site. The reason for this is that under the Multiple Award Service Contract (MASC) of GSA, service is limited to $25,000 per year. This "service" can be translated into systems analysis, software

implementation and maintenance, programming and enhancements. The $25,000 translates into roughly 40% of a manyear. Full service would cost much more.

The argument for a Systems Manager is simply that management control would be best served if a dedicated, knowledgeable individual were available to interface with the vendor who probably knows nothing about the Navy and Human Resources Management. (Booz-Allen and Hamilton, 1981)

F. IN-HOUSE PERFORMANCE COST ELEMENT IDENTIFICATION AND ACCUMULATION

The techniques and terms used in this comparison are specified in OMB Circular No. A-76 (Office of Management and Budget, 1979) and are backed up in Horngren (1977). Detailed explanations of these techniques and definitions of terms in general will not be reproduced in this work.

A cost element is a basic unit of cost such as labor or materials. The accumulation of all these basic units provides the total cost of the product or service being considered.

HRMIN provides a service as its output. The major cost elements that are associated with a service organization are:

1. Direct Labor;
2. Fringe Benefits on Labor;
3. Operations Overhead;
4. Other Direct Costs;

5. General and Administrative Expenses;

6. Inflation;

7. Cost of Capital; and

8. One-Time and Other Costs.

Inflation and One-Time and Other Costs are not germane to this comparison because they examine the base year only of a system that is already running.

These cost elements will each be addressed with respect to the in-house performance of HRMIN. All cost data are actual Fiscal Year 1982 costs which were provided, as mentioned earlier, by the NPRDC Comptroller and the HRMIN System Manager or are estimated as described.

1. Direct Labor

Direct labor cost accumulation will depart from the methods used for the other cost elements of in-house performance. As mentioned before, the actual labor associated with in-house HRMIN in Fiscal Year 1982 was a prorated amount based on the number of hours HRMIN labor was conducted. To be more representative of what an operational system's direct labor cost would be, the positions discussed in Part D of this chapter were used to calculate an estimate of "real" direct labor costs. Table 1 shows the total direct labor charge using these assumptions. The total is $117,845.50. By using the same procedures as in Table 1, the accumulated Direct Labor cost using actual Fiscal Year 1982 data is $125,261.72.

TABLE 1.

HRMIN (FY 1982) Direct Labor Costs

(Positions indicated are estimates of operational system requirements.)

Position	Hours	Basic Hourly Rate	Hourly Rate Based on Annual Salary	Annual Salary	Direct Cost w/o Leave & Holiday Req'd Hourly Rate	Leave & Holiday 18%	Total Direct Labor Costs
System Manager GS 12/1	1 manyear	----	$ 13.58	$28,245	--------	*	$ 28,245.00
Analyst/Programmer GS 11/1	1 manyear	----	$ 11.33	$23,566	--------	*	$ 23,566.00
Computer Operator GS 7/1	1 manyear	----	$ 7.65	$15,922	--------	*	$ 15,922.00
Research Psychologist GS 15/8	1 manyear		$ 27.68	$57,577	--------	*	$ 57,577.00
							[$ 7,464.50]**
					TOTAL:		$117,845.50

* Annual GS salaries include Leave and Holiday adjustments.

** Psychologist's salary limited to $50,112.50.

2. Fringe Benefits on Labor

The Fiscal Year 1982 data shown in Table 2 indicate that fringe benefit costs for Fiscal Year 1982 were $31,357.55. For purposes of this analysis all employees are assumed to be permanent GS employees. These employees are not subject to FICA, are not paid premium pay for holidays and receive no additional fringe benefits. They are, however, eligible for retirement. In addition all labor is considered direct for operation overhead purposes.

3. Operations Overhead Expenses

Operations overhead consists of many types of expense. Each type will be examined individually.

a. Indirect Labor

For the purpose of this study the supervision by the manager and the training of users are considered direct labor in support of the service generated. Indirect labor attributed to this performance is accounted for in the aggregate General and Administrative Expenses total.

b. Indirect Materials and Supplies

This cost sub-element consists of operating supplies such as computer paper. Paper clips, paper, pens and so forth are aggregated into the General and Administrative Expenses total. The supplies used by cost center code are Code 205 (System Manager)--$2,930.00, and Code 16 (Research Psychologist)--$5,132.00. The total applied to HRMIN operation is $8,062.00.

TABLE 2.

Fringe Benefits on Labor (FY 82)
Annual Labor Costs

Cost Elements	Amount Subject to Retirement	Amount Subject to FICA*	Fringe Benefit Amounts
Direct Labor	$ 117,845.00	----	
Indirect Labor Included in Operations, Overhead, and G & A Expenses	2,761.00	----	
Subtotal	$ 120,606.00	-0-	
Retirement at 20.4% of $120,606.00			$ 24,603.62
FICA			-0-
Health, Life Insurance, and Other Benefits at 5.6% of $120,606			6,753.93
Total Standard Fringe Benefits			$ 31,357.55

* All employees are permanent GS employees and therefore are not subject to FICA.

Assumptions:

1. Additional fringe benefits and premium pay for holidays is not considered.
2. To simplify calculations, all labor costs are not subject to FICA but are subject to retirement.

c. Depreciation

Straight line depreciation is the method used to spread the cost of tangible capital assets over their estimated useful life. The tangible assets used for this calculation are the HARRIS minicomputer, four CDC disk drives and all of the terminals in the system. Their estimated useful life is assumed to be five years [author's estimate]. For the purpose of this cost comparison their costs are sunk costs and not considered because by the time of publication of this work all of this capital will be owned by the government.

Depreciation is calculated as follows:

1. HARRIS Computers

Acquisition Cost	$ 298,907
Residual Value	- 24,837
	$ 274,070
Depreciation per Year	$ 54,814

[Cost and residual value calculated during contract negotiations. (Rahilly, 1983)]

2. Disk Drives

Acquisition Cost	$ 52,000
Residual Value	- 5,200
	$ 46,800
Depreciation per Year	$ 9,360

[Cost taken from NMPC budgets. Residual value is an estimate.]

3. Terminals

Estimated Acquisition	$ 67,956
Residual (est. 10% of acquisition)	- 6,796
	$ 61,160

Depreciation per Year	$ 12,232

[Cost taken from NMPC budgets. Residual value is an estimate.]

4. Total Depreciation per Year (FY 82)

HARRIS Computer	$ 54,814	
Disk Drives	9,360	
Terminals	12,232	
TOTAL		$ 76,406

d. Rent

Rent is accounted for in the aggregate General and Administrative Expenses total.

e. Maintenance and Repair

There is a maintenance contract to keep the equipment in operating condition. The Fiscal Year 1982 charge was $34,000.00. The cost is expected to be $40,000.00 in Fiscal Year 1984. In order to be more representative of what an operational system would cost, the Fiscal Year 1984 estimate will be used vice the actual Fiscal Year 1982 costs.

f. Support Costs

Support costs are accounted for in the aggregate General and Administrative Expenses total.

g. Utilities

Utility costs are accounted for in the aggregate General and Administrative Expenses total.

h. Insurance

The cost of the Government being self-insured for this operation is calculated as follows:

Direct Labor		$ 117,846
Fringe Benefits on Labor		31,358
Book Value of Capital		
Acquisition Cost	$ 418,864	
Less Depreciation	382,030	36,838
		$ 186,040

Insurance factor = .0006 x total = $112.00 per year

The operations overhead expenses to be used in this section are summarized and totaled in Table 3.

TABLE 3.

Operation Overhead Expenses (FY 82)

a.	Indirect Labor	N/A
b.	Indirect Materials and Supplies	$ 8,062.00
c.	Depreciation	76,406.00
d.	Rent	(G & A)
e.	Maintenance and Repair	40,000.00
f.	Support Costs	(G & A)
g.	Utilities	(G & A)
h.	Insurance	112.00
	Total Operations Overhead	$ 124,580.00

4. Other Direct Costs

This cost element contains four sub-elements. The first is the annual royalty paid for the use of the SPSS software package. The actual 1982 cost was $2,500.00. Since

then this cost has risen to $3,500.00. This second value will be used because it is more representative. The second sub-element is travel expenses. The cost for Fiscal Year 1982 was $1,950.00 for NPRDC personnel. The third sub-element is training costs. For Fiscal Year 1982 $8,000.00 was expended.

The last sub-element is the largest. It is the cost of the telecommunications services used to make HRMIN a network. About $2,000.00 a month is a fixed cost. There is a variable cost portion that varies with usage. The November 1982 variable cost was about $1,500.00. The total cost of about $3,500.00 is assumed to be representative of the percent utilization profile. This charge is user-sensitive. The actual system utilization will drive this cost the most of any in-house application cost. The Fiscal Year 1982 telecommunication charge is calculated per month "representative" rate. It is $42,000.00. Close inspection will show that the sensitivity of this analysis is significant but probably not material. A doubling of use would increase the yearly in-house cost by about $18,000.00. The total for this element is $55,450.00.

5. General and Administrative Expenses (G & A)

For the purpose of this analysis the HRMIN application at NPRDC is considered self-sufficient. The G & A expense pool at NPRDC charges a portion of the pool to each cost center. It is further broken down by job order.

The G & A cost elements by cost center code are: Code 205--$17,268.00 and Code 16--$14,219.00. The total G & A cost for Fiscal Year 1982 was $31,487.00.

6. Inflation

Inflation is not germane to a base year cost comparison. The author has no reason to suspect that inflation of costs for the out years will occur at different rates for either performance possibility.

7. Cost of Capital

This item attempts to determine the opportunity cost; i.e., if the capital had not been devoted to this performance, it could have been devoted to another which would have provided other income or avoided interest expenses.

Using the assumptions and values of Section 3 of this chapter the net book value to date of the capital assets is $418,863.00 - 191,015.00 = $227,848.00. The opportunity cost rate is 10%. Therefore the cost of capital is $22,785.00.

8. One-Time Costs and Other Costs

One-time and other costs are not appropriate to this chapter because it is assessing an existing in-house performance.

9. Summary of Part F

Part F has presented the accumulation of in-house performance cost elements. The documentation details to support this presentation can be obtained from NMPC and NPRDC RMS accounting records. Cost estimates and their underlying

assumptions were included in this presentation when appropriate. The total accumulation of in-house performance cost elements is presented in Table 4.

TABLE 4.

Comparative Cost Analysis
In-House Performance (FY 82)
Cost Element Accumulation

a.	Direct Labor	$ 117,845.00
b.	Fringe Benefits on Direct Labor	31,358.00
c.	Operations Overhead	124,580.00
d.	Other Direct Costs	55,450.00
e.	General and Administrative Expenses	31,487.00
f.	Cost of Capital	22,785.00
	Total In-House Performance Cost	$ 383,505.00

G. CONTRACTING-OUT, CONTRACT COST DEVELOPMENT

The timesharing service costs shown in Appendix E are the backbone of this section. These costs were developed using the best information available at the time. Since then a utilization profile has become more apparent. The Booz-Allen and Hamilton study (1981, p. 31-33) estimated the expected utilization profile. They considered connect time, on-line storage, batch processing requirements, and a typical SPSS job utilization rate. Based on these estimates they

benchmarked the respondents represented in Appendix E. The benchmark package consisted of three "typical" SPSS programs supplied by NPRDC. (Benchmarking is discussed in Section C of this chapter.)

The benchmark was conducted in 1980 [before the system had any users]. The estimates appear to be reasonable today with the exception of connect time. Connect time has a direct relation to use. It is assumed that all connect time is functional and not taken up by learners making mistakes on a terminal. For the purpose of this work it is assumed that the connect time charges and the resulting processing time charges should be adjusted to reflect a more real rate of HRMIN use. It is further assumed that all other contract-out costs considered by the Booz-Allen and Hamilton study (1981) are valid. For the timesharing service cost generation, the on-line storage requirements remain the same at three years of data. Other charges such as SPSS surcharges are considered unchanged also. Discounts offered are considered still valid (see Note 4 of Appendix E).

The other cost elements considered by Booz-Allen and Hamilton (1981) are the lease of the teleprinter and graphics terminals needed for "their" network, and dedicated HRM program personnel to function as a System Manager and a maintenance Analyst/Programmer to offset the high additional cost of having the service bureau perform all maintenance.

The last assumption necessary to consider is that processing time is directly proportional to connect time on the average. The HRMSS is a homogeneous organization and all HRMIN kinds of jobs are not essentially different from different generation points.

1. User Profile Determination

The HARRIS job accounting feature produces a usage report. These data were obtained for the months of September through December 1982. Because these data are the most current they will be assumed to be representative of real HRMIN usage for the base year. Another source of usage data is a summary of user hours from Tymnet records. Data of this type were obtained for the period 30 November 1982 to 23 December 1982. These data are also assumed to be representative of real HRMIN usage for the base year.

HRMIN usage will increase as the remaining user nodes become active. It will also increase as the users become more knowledgeable of and comfortable with the system. However, for the purposes of this comparison, these potential increases will not be considered.

a. Computations

Total system usage is calculated by using the HARRIS job accounting feature mentioned above. The data are presented as individual part usage expressed as allocated time. A total of central processing unit (CPU) time is also presented. For the period of 1 September 1982 through

31 December 1982 the sum of all of the allocated time was 1,598 hours and 20 minutes. The total CPU time to support this connect time was 223 hours and 47 minutes. The ratio of connect time to CPU time is a very low 7.14 to 1. This ratio is probably due to the fact that the preponderance of HRMIN usage is simply administrative, such as the electronic mail system.

This argument is supported by examining the remote user connect time obtained from the Tymnet user data. These data do not include the host site. They show an average of 4.8 hours per day for each remote site. This is based on 81.75 hours for 17 working days. The total connect time for 1982 based on working days for the data collection period is 18.2 hours per day. (Working days assume no work on Saturday or Sunday.) A working year for a GS employee is assumed to be 2,080 hours or 260 8-hour days. The 18.2 hours total minus 4.8 hours of remote user time suggests a 13.4 hour workday. This can be explained by considering the long computational time necessary to merge new HRM survey data.

The "real" yearly connect time for the base year being considered is therefore 4,740.5 hours.

The method of adjusting connect time and consequent processing costs is dependent on this postulated "real" amount of Fiscal Year 1982 in-house connect time. The connect time yearly cost from Appendix E for Tymshare was divided by a $16/hour rate (Gurian, 1982). This is the

maximum charge, assuming peak hours usage only. This worst case value will cause the adjustment factor to be the smallest and consequently reductions of the times (and resultant) charges would be the largest. If in fact a smaller charge was used, the contract cost would be larger.

The adjustment factor for Tymshare was calculated by dividing $219,120 by $16/hour to yield 13,695 hours. This is the "worst case" amount of time determined from the benchmark by Tymshare. The value was then divided by the postulated 4,740 hours of in-house performance. The adjustment factor is then 2.9. That is, the connect time and consequent processing time charges were 2.9 times too high as determined by the benchmark.

The assumption that the rate used by Boeing's Mainstream EKS service is the same as Tymshare's allows the application of the same adjustment factor to its services. The results of this adjustment to the costs depicted in Appendix E are presented in Table 5. The total of contract-out costs as mentioned earlier and in Booz-Allen and Hamilton (1981) is presented as Table 6.

2. Summary Part G

Due to a lack of resources of the author to conduct a benchmark of potential computer service vendors the data in Appendix E were adjusted. The postulation of a "real" Fiscal Year 1982 HRMIN user profile was done by assuming the representativeness of available user data. These data

TABLE 5.

Timesharing Service, Cost Adjustments

Cost Component	Mainstream EKS		Tymshare	
	Appendix E	Adjusted	Appendix E	Adjusted
Connect Time	$ 151,368	$ 52,196	$ 219,120	$ 75,559
Storage*	239,784	239,784	181,440	181,440
Computer Processing	769,322	265,283	1,981,284	683,201
Other*	1,200	1,200	1,200	1,200
Total Before Discount	$1,161,684	$ 558,463	$2,383,044	$ 941,400
Discount % (Given to Government)	35.04%	35.04%	25%	25%
Total After Discount	$ 799,097	$ 360,503	$1,787,283	$ 706,050

* No adjustments assumed.

TABLE 6.

Adjusted HRMIN Contract-Out Performance Cost Accumulation

Cost Component	Mainstream EKS	Tymshare
Timesharing Services	$ 360,503	$ 706,050
Teleprinter Lease	14,040	14,040
Graphics Terminal Lease	14,800	14,800
Personnel Costs		
System Manager, GS-12	28,245	28,245
Analyst/Programmer, GS-11	23,566	23,566
Training Costs	8,800	8,800
System Generation	6,000	6,000
TOTALS	$ 455,954	$ 801,501

indicated a Fiscal Year 1982 HRMIN connect time of 4,740 hours. The benchmarked costs of Appendix E were adjusted using a factor of 2.9; that is, Tymnet calculated 2.9 times too much connect time in their benchmark.

H. SUMMARY

Chapter IV presented an economic analysis using the cost comparison framework specified in OMB Circular No. A-76 of 5 April 1979. The results of this comparison, considering the assumptions and estimations made, indicate that in-house performance of HRMIN is the most beneficial alternative for the taxpayers in the United States. The intent of this work has been to examine only the operating costs of two alternatives; therefore other considerations, such as service life, benefits, salvage value and so on, have been ignored. Other methods exist to compare alternatives when mere inspection is not enough. Present Value Analysis is one such method and will be afforded a brief look in Appendix F.

V. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

A. RESULTS

Chapter IV accumulated the in-house performance costs of HRMIN and developed contract performance costs for two different vendors. OMB Circular No. A-76 requires the "low bid" be used when conducting a cost comparison. It also states:

> When the basic contract price exceeds the total in-house costs it can be assumed that the cost of in-house performance will be less than the cost of contracting-out. This assumption precludes the necessity for completing the portions of the comparison dealing with the cost of contracting-out. Completion of these portions would only serve to document the net additional costs which must be added to the contract price. Since the contract price already exceeds the cost of in-house performance such information would not alter the ultimate conclusion of the comparison. (Office of Management and Budget, 1979, p. 20582)

The only exception to this is the consideration of potential federal income taxes, and proceeds from disposal of assets. The IRS tax rate for this type of company is 2% and the assets are assumed to be subject to incorporation in the GSA sharing program and therefore not disposed of. Neither of these potential offsets would alter the conclusion of the comparison especially when such things as the cost of administering the contract (4%) is added to the basic price.

The numerical result of this comparison is therefore straightforward. From Tables 4 and 6 the result is:

Total Cost In-House Performance	$ 383,505.00
Lowest Cost Contract-Out Performance	455,954.00
Cost Differential	[$ 72,449.00]
(In-House minus Contract-Out)	(bracket means negative)

In simple terms, utilizing the framework and assumptions specified in this thesis, the cost of performing the operations that are presently required of the Human Resource Management Information Network are less for an in-house performance than they would be to contract-out the required performance.

B. CONCLUSIONS

Based on the results indicated above the author must conclude that if HRMIN can remain at NPRDC in an operational status as described in this work, it would be the right method of performance based on the provisions specified in OMB Circular No. A-76. HRMIN performance is not inherently governmental--satisfactory commercial sources to provide the service do exist--but the most economical performance is in-house. Therefore, conversion to contract-out performance should not be considered.

C. RECOMMENDATIONS

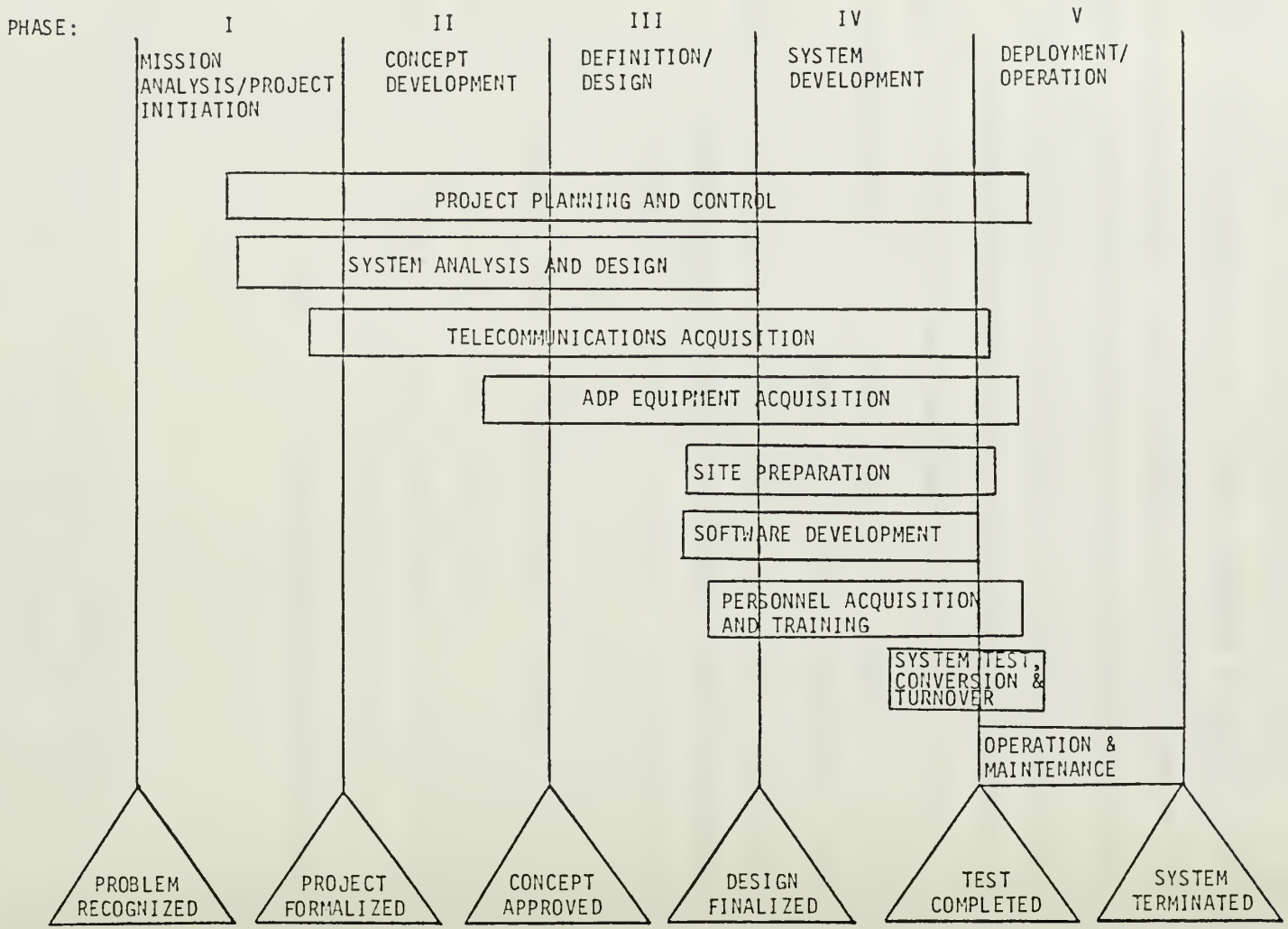
It is recommended that this study be repeated when a historical usage pattern for HRMIN is documented. After about five years of operation, when the revisions to the HRMSS have settled down and the potential applications of

HRMIN use have become reality, it would be advisable to re-evaluate this question of economy. It would also be a time when the HARRIS 135/6 will probably be more than ready to be replaced by a younger and more capable successor. On the other hand, by then the computer services vendors may have increased their capabilities and reduced their costs because of technological and competitive reasons.

Given the way the information processing industry is evolving today, five years might be too long before a new cost comparison should be conducted. It is the responsibility of the HRMIN managers to observe their environment and to act when the time is right.

APPENDIX A

PHASES OF SYSTEM DEVELOPMENT



APPENDIX B

06/09/82

HRM DATABASE

The HRM Survey is an attitudinal/descriptive survey which provides management information to the program sponsor and the HRM Specialists. Its uses include identifying potential and existing problems within Navy organizations as well as for research applications.

The Survey consists of demographics (age, race, sex, years in Navy, paygrade, etc.) and 88 questions, covering topics such as communications, leadership, equal opportunity, race relations training and utilization, motivation and morale, drug and alcohol abuse, and interaction with people from other countries.

Every 18-24 months, a team of HRM Specialists (from San Diego, Norfolk, and Pearl Harbor) schedule an initial visit with the command at which time the Commanding Officer has several options. The CO may decide that there is no further need for HRM services; in this case, the Survey is not given and the HRM team will revisit in another 18-24 months, or the decision might be to have the command participate in the HRM Survey, in which case the Team gives the Survey and then sends the answer sheets to NARDAC for scanning and

processing. The HRM Team will then brief the Commanding Officer on the results and identify areas of concern.

Next, each HRMC sends the data to NPRDC in San Diego for entry into the HRM Database, which contains the most recent 3 years of HRM Survey data. The raw data consists of three types of records. For each unit, there are two header records which give information about the command. The first one includes data such as unit name, TYCOM, fleet, type class, and Survey date; the second header record has information concerning the supplemental questions--how many and which supplementals were given. The third type of record is the respondent's record and contains demographic information and answers to the Survey and supplemental questions.

The raw data arrives on tape and is then run through a series of programs which convert the data to its final processed form. These programs perform editing functions, make consistency checks, create a unit record using information from the first two header records, and create Survey records from the respondent's records. In addition, 28 indices (means of selected questions) are computed from the survey items.

Once the new individual Survey records and unit records are sorted and merged into the database, any data older than three years is removed and stored on tape. If you need to access this data, it is considered a special request and must be submitted in writing to NPRDC for approval.

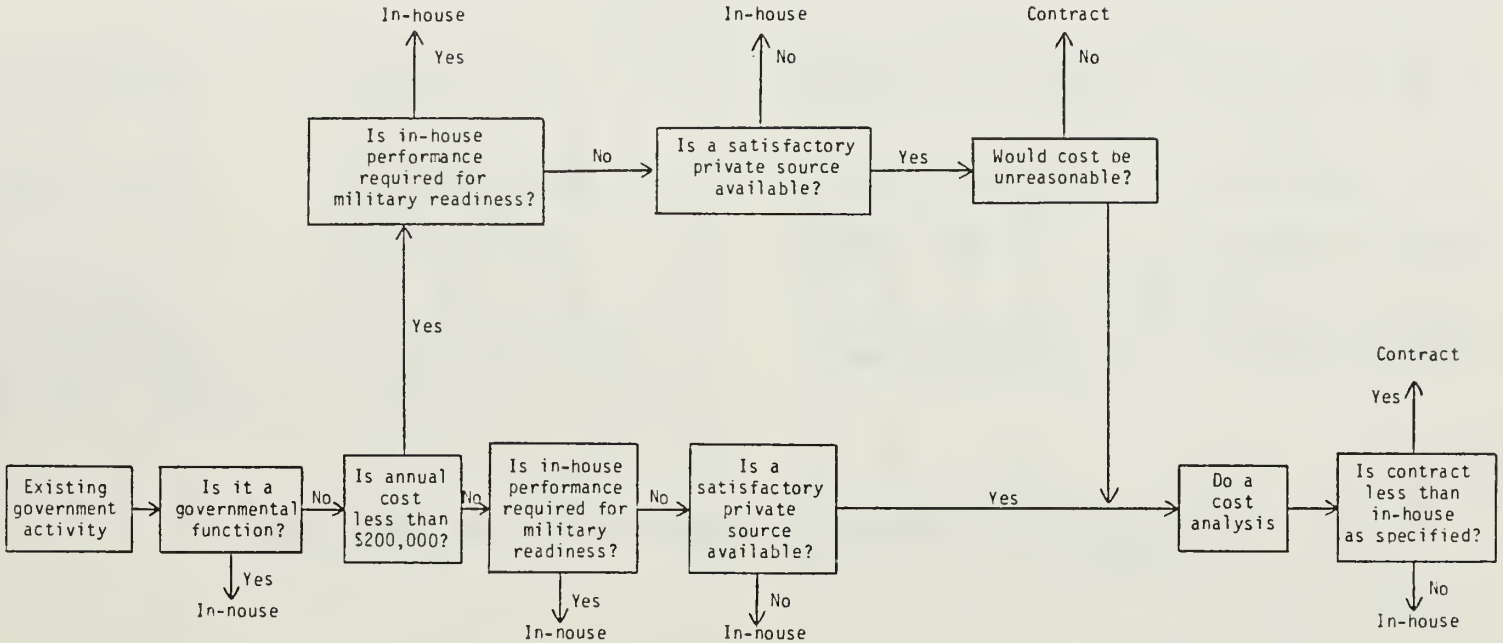
APPENDIX C

THE GORRY AND SCOTT MORTON FRAMEWORK FOR MIS'S

Classification	Operational Control	Management Control	Strategic Planning
Structured	Order Processing Accounts Payable	Budgets Personnel Reports	Warehouse Location Transportation Mode Mix
Semistructured	Inventory Control Production Planning	Analysis of Variance	Introduction of New Products
Unstructured	Cash Management	Management of Personnel	Planning for R&D

APPENDIX D

IMPLEMENTATION OF OMB CIRCULAR A-76



APPENDIX E

EXHIBIT B-1
INDIVIDUAL ANNUAL TIME-SHARING SERVICE COSTS[1]

COST COMPONENT	BOEING COMPUTER SERVICES MAINSTREAM 750	BOEING COMPUTER SERVICES MAINSTREAM EKS	OPTIMUM SYSTEMS, INC.[2]	TYMSHARE[2]	UNNAMED VENDOR
Connect Time	151,368	151,368	89,484	219,120	186,252
Storage	56,292	239,784	36,360	181,440	241,800
Computer Processing[3]	1,092,468	769,332	395,208	1,981,284	2,066,628
Other Charges	1,200	1,200	1,200	1,200	1,200
Total Before Discount	1,301,328	1,161,684	522,252	2,383,044	2,495,880
Discount[4]	34.2%[5]	35.04%[5]	17.5%	25%	40.61%
Total After Discount	$937,848	$799,092	430,858	1,787,283	1,482,303

1) Costs were computed based on standard charges from each vendor's Teleprocessing Services Program (TSP) Authorized Schedule Price List for Fiscal Year 1981. Substantial decreases in actual costs should result from a competitive procurement.

2) Actual computer processing charges would be slightly lower for these two vendors as the number of records processed in their copy of the "benchmark" was 60% higher than the other two vendors "benchmark".

3) A "benchmark" program was used by each vendor to estimate typical processing costs. An assumption was made that the "benchmark" would be run twice daily in each site. Additionally it was estimated that 33% of all runs are processed in 1-hour batch priority, 33% of all runs in 4-hour batch priority, and 33% of all runs in overnight priority.

4) Discounts fluctuate as each vendor's volume of business with the government changes. Actual discounts can be better when services are obtained from an existing Navy contract ("piggybacking").

5) For this vendor the discount is not applied to the SPSS surcharge portion of computer processing costs. Therefore, direct application of the discount percentage to the initial total will produce a different and erroneous total after the discount.

APPENDIX F

NET PRESENT VALUE ANALYSIS

Money is a marketable commodity. When not used for other purposes, it can increase in value because interest is paid by others to use it. Money becomes more valuable over time. By discounting future cash flows to today's "present value" a look at what future expenditures will really cost is obtained. Present value analysis examines the alternatives on a common basis of time and cost to make a comparison.

Present value analysis is not really germane when evaluating government investments because the government has no option of banking money to earn a return.

> Here it must be recognized that the 'return' implied by the 10% discount rate does not refer to the result of the government holding money, but rather to the opportunity cost imputed through the transfer of resources from the private to the public sector. (Naval Data Automation Command, 1980, p. 9-8)

For the purpose of this brief look at a Net Present Value analysis, the same assumptions and estimations are in effect as stated in the body of this work. It is also assumed that no changes will occur in the variable tangible costs examined for each alternative. These costs will recur for each year of the five year useful life. Further, the "immortal" nature of service companies will be ignored and an equal five year life will be assumed for each alternative. The techniques of

discounting cash flows will not be examined further in this work. Horngren (1977) and the Naval Data Automation Command (1980) should be consulted for details of this technique.

The cost elements displayed in Tables 7 and 8 are considered material to this analysis. The offset of 2% for income taxes will not affect the outcome of this analysis and the 4% contract management cost will only amplify the results. The intangible costs such as cost of capital and insurance are also too small to be material to this analysis.

The results of this analysis also indicate that, as presently defined, the in-house application of HRMIN is the most beneficial to the taxpayers. The difference of $688,940 is in favor of in-house performance.

TABLE 7.

Present Value Analysis
In-House Performance

Cost Element	FY 82	FY 83	FY 84	FY 85	FY 86	Total Cost
One-Time Costs						
Capital Assets Residual Value					($36,833)	($36,833)
Recurring Costs						
SPSS Royalties	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 17,500
Labor (Direct and Fringes)	$149,203	$149,203	$149,203	$149,203	$149,203	$ 746,015
Maintenance	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 200,000
Supplies	$ 8,062	$ 8,062	$ 8,062	$ 8,062	$ 8,062	$ 40,310
Travel/Training	$ 9,950	$ 9,950	$ 9,950	$ 9,950	$ 9,950	$ 49,750
Telecommunications	$ 42,000	$ 42,000	$ 42,000	$ 42,000	$ 42,000	$ 210,000
General and Administrative Expenses	$ 31,487	$ 31,487	$ 31,487	$ 31,487	$ 31,487	$ 157,453
Total Undiscounted Costs	$284,202	$284,202	$284,282	$284,202	$247,369	$1,384,177
Discount Factor 10% (0% Differential Inflation)	.954	.867	.788	.717	.652	
Total Discounted Costs	$271,129	$246,403	$223,951	$203,773	$161,285	$1,106,541

Note: All other costs are intangible or sunk costs.

TABLE 8.

Present Value Analysis
Contract Performance

Cost Element	FY 82	FY 83	FY 84	FY 85	FY 86	Total Cost
One-Time Costs						
System Generation	$ 6,000					$ 6,000
Recurring Costs						
Equipment Lease	$ 28,800	$ 28,800	$ 28,800	$ 28,800	$ 28,800	$ 140,000
Labor (On-Site Reps.)	$ 51,811	$ 51,811	$ 51,811	$ 51,811	$ 51,811	$ 259,055
Training	$ 8,800	$ 8,800	$ 8,800	$ 8,800	$ 8,800	$ 44,000
Timesharing Costs (Low Bidder)	$360,503	$360,503	$360,503	$360,503	$360,503	$1,802,512
Total Undiscounted Costs	$455,914	$449,914	$449,914	$449,914	$449,914	$2,251,570
Discount Factor 10% (0% Differential Inflation)	.954	.867	.788	.717	.652	
Total Discounted Costs	$434,942	$390,075	$354,532	$322,588	$293,344	$1,795,481

LIST OF REFERENCES

Ackoff, R.L., "Management Misinformation Systems," Management Science, v. 14, n. 4, pp. B-147-156, December 1967.

Aver, J. and Scoggins, J., "Contracting for EDP Maximum Protection at Minimum Cost. Are You Getting What You Are Paying For?" Governmental Finance, v. 6, n. 3, pp. 18-24, August 1977.

Benwell, N., Benchmarking, Wiley and Sons, 1975.

Booz-Allen & Hamilton, Inc. Report EG-05, A Feasibility Assessment of the Human Resource Management Information Network (HRMIN) Utilization for Current Equal Opportunity Data Requirements, by P. Gaskin and T. Hoffman, 11 April 1980.

Booz-Allen & Hamilton, Inc. Report EG-09112, Human Resource Management (HRM) Survey Database System Alternative Location Analysis, by P. Gaskin and M.A. McCleary, 6 March 1981.

Booz-Allen & Hamilton, Inc. Report EG-05, HRM Operations Report Requirements Analysis and Design, by S. Bishop, 28 September 1982.

Bossart, D., Naval Military Personnel Command (NMPC-62), Washington, DC, Telephone Interview 21 January 1983.

Buckley, J.W., Buckley, M.H., and Hung-Fu Chiang, Research Methodology & Business Decisions, National Association of Accountants and the Society of Industrial Accountants of Canada, 1976.

Chief of Naval Operations, OPNAV Instruction 5300.6B, Navy Human Resource Management Support System, 10 October 1975.

Chief of Naval Personnel Memo Pers 3Y: Serial 3Y/238-78 to Chief of Naval Personnel for Human Resource Management, Subject: Human Resource Management Information System, Approval For, 2 August 1978.

Datapro Research Corporation, Datapro Reports on Minicomputers, v. 2, 1982.

Davies, D.W. and Others, Computer Networks and Their Protocols, Wiley, 1979.

Dearden, J., "MIS is a Mirage," Harvard Business Review, pp. 90-99, January-February 1972.

Dewing, P.L., Systems Management and Organization Theory, Unpublished Manuscript, Ch. 8, University of Southern California, 1979.

Dooskin, H., "Equitable Billing of Computer Services," Datamation, pp. 34-35, April 1980.

Friedrich, O., "The Computer Move In," TIME, v. 121, n. 1, pp. 14-24, 3 January 1983.

Gorry, A. and Scott Morton, M., "A Framework for Management Information Systems," Sloan Management Review, v. 13, n. 1, pp. 55-70, Fall 1971.

Gurian, P., General Services Administration, San Francisco, California, Interview 15 November 1982.

Hagin, R. and Mader, C., Information Systems: Technology, Economics, Application, Science Research Associates, 1974.

Horngren, C.T., Cost Accounting: A Managerial Emphasis, Prentice-Hall, 1977.

Krauss, L.I., Computer-Based Management Information Systems, American Management Association, Inc., 1970.

Leavitt, H.J. and Whisler, T.L., "Management in the 1980's," Harvard Business Review, pp. 41-48, November-December 1958.

Lucas, H.C., Information Systems Concepts for Management, McGraw-Hill, 1982.

McKinley, H., "What is HRMIN?" proposed article for publication in the HRM Journal, 1 November 1978, [subsequently modified and published].

Mission Element Needs Statement (MENS) for the Human Resource Management Information Network (HRMIN), Author and Date unknown.

Mitchell, J.W., "Bureau or 'In-House'?" Accountants Digest, v. 41, n. 4, pp. 206-208, June 1976.

Naval Audit Service, Report #M00032, Management Consulting Report for the Navy Human Resource Management System Cost-Performance System, by V. Conradt-Eberlin and E. Hickson, May 1982.

Naval Data Automation Command, Pub. 15 7000, Economic Analysis Procedures for ADP, by D.C. Zimmerman, 12 March 1980.

Naval Military Personnel Command (NMPC), Memo N-6C:5350:Serial N-61575, to the record, Subject: Development and Operation of the Human Resource Management Information Network (HRMIN), 11 June 1981.

Navy Personnel Research and Development Center (NPRDC) Report TR 75-21, An Approach for Measuring Benefit and Cost in Management and Information Systems, by D.B. Bearfoot and F.R. DiGalleonardo, October 1974.

Navy Personnel Research and Development Center, HRMIN Users Manual, 1982.

Office of Management and Budget, Office of Federal Procurement Policy, "Acquiring of Commercial or Industrial Products and Service Needed by the Government: Policy Revision (OMB Circular A-76)," Federal Register, v. 44, n. 67, pp. 20556-205574, 5 April 1979.

Rahilly, D., Navy Personnel Research and Development Center (NPRDC), San Diego, California, Interviews 18-20 January 1982.

Rockart, J., "Chief Executives Define Their Own Data Needs," Harvard Business Review, v. 57, n. 2, pp. 81-93, March-April 1979.

Secretary of the Navy (SECNAV), Instruction 5231.1A, Life Cycle Management of Automated Information Systems (AIS) in the Department of the Navy, 20 November 1979.

Tanenbaum, A.S., Computer Networks, Prentice-Hall, 1981.

Thomas, E., Navy Personnel Research and Development Center (NPRDC), San Diego, California, Interview 19 January 1982.

Toffler, A., The Third Wave, Bantam/William Morrow, 1980.

Webster's New Collegiate Dictionary, 1976.

Whieldon, D., "Don't Make--Buy! Support from Timesharing Services," Computer Decisions, v. 12, n. 7, pp. 36-50, p. 115, p. 128, July 1980.

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